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ABSTRACT

The purpose of this study was to evaluate vocational education at the senior high school level in terms of both private and social costs and returns. Data on costs of vocational training and potential earnings with and without vocational training were used to estimate rates of returns on vocational education. Findings of the study indicate that all but one of the 14 vocational programs studied result in benefits--increase in earnings--that exceed costs. The study also indicated how worthwhile these various programs are from a private and social point of view. It points out and attempts to explain inter-program and inter-school differences in rates of return, and points to the existence of economies of scale in this provision of vocational education. (Author/JS)

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| Title of Program or Project: | The Role of Vocational Education in Improving Skills and Earning Capacity in the State of Ohio: A Cost-Benefit Study. |
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ABSTRACT

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| Title of Research Program or Project: | The Role of Vocational Education in Improving Skills and Earning Capacity in the State of Ohio: A Cost-Benefit Study. |
| Principal Investigators: | Dr. Lowell E. Gallaway<br>Dr. Ismail A. Ghazalah |
| Contracting Agency: | Division of Vocational Education<br>Department of Education<br>State of Ohio |
| Amount of State Funds Expended | $15,060 |

1. *Statement of Problem:* Vocational education has all the attributes of an investment, i.e., it is aimed at increasing the productivity and earnings of participants. An evaluation of the economic effects of vocational education in Ohio is necessary for potential trainees, communities and the State government in order to arrive at optimal decisions regarding the level and composition of vocational education expenditures.

2. *Statement of the Objectives:* The project examines and evaluates the private and social costs and returns accruing from investment in vocational education at the Senior High School level in the State of Ohio.

3. *Description of Activities: Fourteen* vocational programs in the training areas of trade and industrial service, business office education, agricultural service, distributive education service and home economics service were studied in *eighteen* high schools in the State. Data on costs and on potential earnings were obtained to determine the return on investment by program and by school.

4. *Techniques of Evaluation of Objectives:* Benefit-Cost analysis was used to evaluate investment in the vocational programs. Two sets of rates of return were estimated assuming (1) vocational education as an investment in dropout prevention and (2) vocational education as an alternative to completion of an academic high school education.

5. *Contribution to Education:* Findings of the study indicate that all but one of the vocational programs studied result in benefits (increase in earnings) that exceed costs. The study also indicates how worthwhile are these various programs from a private and a social point of view. It points out and attempts to explain inter-program and inter-school differences in rates of return and points to the existence of economies of scale in the provision of vocational education.

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I

# STATEMENT OF THE PROBLEM: EVALUATION OF VOCATIONAL EDUCATION

## A. *Introduction*

On October 16, 1968, the President of the United States signed into law the Vocational Education Amendment of 1968, which provided for the authorization of increased expenditures for vocational education through the fiscal year 1972-1973 and pointed toward new directions for vocational education.[1]

The State of Ohio's strong committment to vocational education is reflected in the level of public expenditures on this function in the fiscal year 1970. In addition to the $4,798,750 which the State of Ohio was provided in construction funds from Federal Vocational Education Appropriations, additional state and local funds were appropriated in the amount of $37,908,000. Including the financial involvement of Appalachia and Bureau of Vocational Rehabilitation funds, a grand total of $49,028,615 was expended for vocational education in fiscal year 1970.[2]

The increased interest in vocational education has sharpened the debate in the State of Ohio on the scope and effectiveness of vocational programs. An evaluation of the economic effects of vocational education in Ohio is necessary for potential trainees and local communities. It is particularly important for the state government to know the benefits and costs of vocational education in order to arrive at an efficient allocation of the state's educational resources among the various competing uses.

## B. *Vocational Education as an Investment*

Educational services produced by schools are both a consumption good and an investment good. As a *consumption* good, the value of education is the increase in appreciation of life from the academic and liberal arts point of view -- education is desired for its own sake. Educational services also have an impact upon the future occupational choice and earnings of the recipients. In this *investment* sense, the value of

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[1] *Notes and Working Papers Concerning the Administration of Programs*, authorized under the Vocational Education Act of 1963, Public Law 88-210, as amended, prepared for the Subcommittee on Education of the Committee on Labor and Public Welfare, U.S. Senate, 90th Congress, 2nd Session, March 1968.

[2] Ohio Division of Vocational Education, *1969-70 Annual Report*, Columbus, Ohio, p. 13.

education is as a source of earned income characterized by education in professional, occupational, or vocational schools.

Clearly it may not be assumed that the two types of education are mutually exclusive. Elements of consumption and investment benefits are present in each type of education. Yet an educational plan designed to increase the quality of life and responsibility of citizenship, independent of income or productivity consideration, would necessarily concentrate on consumption education, while an educational plan designed primarily to increase productivity and income would logically concentrate on investment education.

This study is concerned with the investment aspects of vocational education. Vocational education will be viewed as an investment in human capital -- a concept which serves to explain returns to investment in the labor force. As early as 1776, Adam Smith enounced this idea in the *Wealth of Nations*:

> "The acquisition of such talents by maintenance of the acquirer during his education, study or apprenticeship, always costs a real expence, which is a capital fixed and realized, as it were in his person. These talents, as they make a part of his fortune, so do they likewise of the society to which he belongs. The improved dexterity of a workman may be considered in the same light as a machine or instrument of trade which facilitates and abridges labour, and which though it costs a certain expence, repays the expence with a profit."[3]

Assuming the rational consideration of available alternatives, educational decision-makers must possess knowledge crucial to the relationship between investment in vocational education and economic return.

The measurement of economic returns will be considered in terms of the labor market participation of vocational graduates. This does not include all economic returns. Aside from earnings and employment, vocational education (as all other forms of education) produces other tangible benefits to the community in the form of additional tax revenues generated by subsequent greater productivity and larger output. Other benefits to the community accrue in the form of lower rates of unemployment and consequently decreased expenditures for unemployment compensation, public assistance and other governmental services such as crime protection.

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[3] Adam Smith, *An Inquiry Into the Nature and Causes of the Wealth of Nations*. Edwin Cannan (ed.), The Modern Library, Random House, 1937, New York, pp. 265-266.

The measurement of returns on vocational education will not include non-economic factors. These may be divided into two types: (1) factors r lated specifically to the job environment: greater satisfaction and a higher sense of personal worth from training for and working in an occupation of one's own choosing;[4] (2) social interaction: the increase in social participation brought about by more self-acceptance and self-confidence enhanced by accomplishment of a specific goal (completion of a vocational program).

Narrowing the analysis to the economic factors in vocational education is a simplification warranted by the fact that economic factors are measurable in a common unit. Therefore, a statistical test of the hypothesis that investment in vocational education is worthwhile becomes possible. The simplification, however, has the drawback that it could lead to the acceptance of a faulty hypothesis (if economic gains are offset by non-economic losses) or the rejection of a valid hypothesis (if non-economic gains are present notwithstanding the absence of economic gains). The simplification should in no way be interpreted as a denial of the non-economic values of vocational education but as a judgment that they are unlikely to be greater in magnitude and opposite in direction than the economic factors.

### *C. Studies of Vocational Education*

The present concern with economic growth and with problems of structural unemployment and poverty has revitalized interest in the theory of human investment and its application to education in its different facets and levels.[5]

A number of applications have been conducted in the area of vocational education. These empirical studies have yielded different results depending upon (1) the method of treating income and other effects of vocational education, (2) the level of vocational education -- secondary or post-secondary, and (3) the length of observation of the trainees in the labor force. Related to this is the period over which the effects of the investment in vocational education are estimated.

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[4] While no systematic analysis of career satisfaction was undertaken in this study, data obtained from available follow-up studies on vocational graduates suggest a high percentage of placement in the specific areas of training.

[5] T. W. Shultz, "Investment in Human Capital", *American Economic Review* (March 1961), pp. 1-17; Edward F. Denison, *The Sources of Economic Growth in the United States and Alternatives Before Us* (New York: Committee for Economic Development, 1964); T. W. Schultz, *The Economic Value of Education* (New York: Columbia University Press, 1963); Gary Becker, *Human Capital* (New York: Columbia University Press, 1964).

*Somers and Stromsdorfer*[6] observed the employment experiences of a group of area vocational training program graduates and a group of (not necessarily matched) non-trainees over a period of 24 months. They found that the expected benefits over the working life by far exceeded the cost.

*Carroll and Ihnen*[7] found in a study of graduates of a two-year technical institute and a matched group of cohorts that although the total cost per graduate was $7,425, it generated an average return of $1,482 per annum over the expected working life resulting in a rate of return of 16.7 percent. Assumption of a 2 percent income growth per annum for graduates and control subjects alike resulted in a rate of return of 20.1 percent. The conclusions are based exclusively on immediate labor force experience in a local labor market and a relatively homogeneous study population.

*Kaufman et al*[8] observed the employment experiences of a group of vocational-technical school graduates and a matched group of non-college academic graduates for a six-year period. They found that the vocational technical group had higher earnings and rate of employment, but the employment differences were decreasing by the end of the period.

*Corazzini*[9] found that post-high school vocational training resulted in a $160 benefit (measured by the starting wage). The $160 differentials, if discounted at 5 percent, would not equal the discounted training cost ($4,965) within the expected working life of the graduate.

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[6] G. G. Somers and E. W. Stromsdorfer, "A Benefit-Cost Analysis of Manpower Retraining", *Industrial Relations Research Association*, Proceedings (December 1964), pp. 172-185.

[7] Adger B. Carroll and Loren A. Ihnen, "Costs and Returns for Investment in Technical Schooling by a Group of North Carolina High School Graduates", *Economic Research Report No. 5*, Department of Economics, North Carolina State University (December 1967).

[8] J. J. Kaufman, et al, *An Analysis of Comparative Costs and Benefits of Vocational Vs. Academic Education in Secondary School*, Preliminary Report, Pennsylvania State University (October 1967).

[9] A. J. Corazzini, "When Should Vocational Education Begin?" *The Journal of Human Resources* (Winter 1967).

*Pejovich, Facka, and Tatom*[10] examined social and private costs, benefits, and rates of return in eleven fields of study of a post-secondary technical institute. They found average social rates of return ranging from 15 percent to 94 percent and private rates of return as high as 168 percent.

*Hu, Lee, and Stromsdorfer*[11] calculated rates of return for the vocational-technical vis-a-vis the comprehensive senior high school graduates over a period of six years following graduation and found the rate of return to investment in vocational-technical education to be considerably greater than the return to investment in comprehensive education.

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[10] S. Pejovich, D. Facka, and J. Tatom, *Social and Private Costs and Rates of Return for Post-Secondary Technical Education in the Southwest*, Department of Economics, Texas A&M University, College Station, Texas, June 1969.

[11] T. Hu, M. L. Lee, and E. W. Stromsdorfer, *A Cost-Effectiveness Study of Vocational Education*, Institute for Research on Human Resources, The Pennsylvania State University, University Park, Pennsylvania, March 1969.

# II

## THE OBJECTIVES OF THE STUDY

The objectives of this study are to examine and evaluate the private and social costs and returns accruing from investment in vocational education at the senior high school level in the State of Ohio.

Data on costs of vocational training and on potential earnings with and without vocational training are used to estimate rates of return on vocational education.

The study offers the following advantages:

1. Vocational education is evaluated both (and separately) as an investment by the individual in himself or herself *and* as an investment by society at large.

2. Rates of return on vocational education at the senior high school level (11th and 12th grades) are measured both as investment in drop-out prevention *and* as an alternative to academic high school education.

3. Earnings rather than wage rates are used in the calculation of benefits.

4. Earnings are projected over the lifetime of the investment by incorporating life expectancy and labor force participation rates and a growth rate of earnings over time.

5. The study population is drawn from seventeen different geographical locations within the State of Ohio (urban-small and large cities, as well as rural centers), from eighteen different vocational institutions (both vocational schools and general high schools with vocational curricula), and from fourteen different vocational curricula.

6. Inter-school and inter-programs differences in rates of return as well as in costs and benefits are analyzed. This analysis should assist decision-makers in their efforts to reach optimal decisions regarding the level and composition of expenditures on vocational education.

III

## DESCRIPTION OF ACTIVITIES: THE STUDY POPULATION

The study included fourteen vocational programs in eighteen Ohio high schools offering vocational education at the 11th and 12th grade level. The selection of schools and programs was made in conjunction with the Division of Vocational Education, Department of Education, the State of Ohio. The selection was aimed at providing a balance in geographical location, urban-rural location, size of the community served, the number of years vocational programs have been in operation, and the type of high school -- a joint vocational district school or a comprehensive school in which academic education predominates in the curriculum.

The fourteen vocational programs were selected from the following different areas of training: trade and industrial service, business office education, agricultural service, distributive education service, and home economics service. Names of schools contained in the study and their locations are shown in Table 1. Vocational programs are listed in Table 2.

During visits to the schools, the research team held discussions with school superintendents or principals as well as members of the administrative staff concerned with the financial and counselling aspects of the vocational program. These discussions contributed substantially to the researchers' understanding of the operation of vocational schools' programs, and proved to be important in interpreting the data which were subsequently provided by school officials. These data included: (1) a detailed financial statement of expenditures incurred during the budgetary year 1970-1971 (See Appendix A), (2) a statement of the value of the school's physical property (land, buildings and improvements, and equipment) itemized and dated by year of acquisition, (3) the total number of pupils in the school (number of vocational as well as academic pupils in the case of comprehensive schools), the number of trainees and of graduates in each of the vocational programs under study, the number of vocational instructors in each program and the total number of vocational and academic teachers in the school (See Appendix B), (4) available follow-up data on vocational graduates such as employment rates, wage rates, types of jobs, and location of jobs. Furthermore, all current trainees in the vocational programs under study were asked to fill out a questionnaire (See Appendix C). In addition to providing a profile of the vocational trainees (family background, geographical origin, future plans) in the various programs, these questionnaires supplied information on earnings of trainees from part-time employment while in training as well as any direct costs incurred by trainees during training.

TABLE 1

LIST OF VOCATIONAL SCHOOLS

| School | Location |
|---|---|
| Ashtabula JVS* | Jefferson |
| Eastland JVS | Groveport |
| Ehove JVS | Milan |
| Four County JVS | Archbold |
| Green County JVS | Xenia |
| Knox County JVS | Mount Vernon |
| Muskingum Area JVS | Zanesville |
| Penta County JVS | Perrysburg |
| Pioneer JVS | Shelby |
| Tri County JVS | Nelsonville |
| Vanguard JVS | Fremont |
| Findlay H.S.** | Findlay |
| Harding H.S. | Warren |
| Lancaster H.S. | Lancaster |
| Macomber Vocational H.S. | Toledo |
| Patterson Cooperative H.S. | Dayton |
| Timken Vocational H.S. | Canton |
| Whitney Vocational H.S. | Toledo |

* Joint Vocational School
** High School

TABLE 2

LIST OF VOCATIONAL PROGRAMS

| Training Area | Programs |
|---|---|
| TRADE AND INDUSTRIAL SERVICE | 1. Welding |
| | 2. Automotive Mechanics |
| | 3. Auto Body Repair |
| | 4. Machine Shop |
| | 5. Drafting |
| | 6. Cosmetology |
| AGRICULTURAL SERVICE | 7. Agricultural Mechanics |
| | 8. Agricultural Production |
| BUSINESS OFFICE EDUCATION | 9. Stenography and Secretarial |
| | 10. General Office |
| | 11. Accounting |
| DISTRIBUTIVE EDUCATION | 12. General Merchandise |
| HOME ECONOMICS | 13. Food Preparation |
| | 14. Child Care |

IV

# TECHNIQUES OF EVALUATION OF OBJECTIVES: FRAMEWORK OF THE ANALYSIS

## A. *Benefit-Cost Analysis and the Rate of Return*

This study evaluates investment in vocational programs using benefit-cost analysis, a technique which assesses the alternative courses of action in order to help decision-makers to maximize net benefits. In the context of expenditures on education, benefit-cost analysis aims at determining (1) whether an expenditure on a particular educational activity is worthwhile, i.e., whether the benefits derived from undertaking the activity outweigh its costs; (2) how worthwhile is one educational activity relative to other educational activities. The latter question is relevant so long as the decision-makers are faced with a budget constraint, i.e., the availability of funds for expenditures on education are limited by budgetary allocation.

The particular benefit-cost criterion used in the study is the *internal rate of return*. An advantage of this criterion is that it provides a simple percentage which can be compared against an interest rate which represents an acceptable rate of social or private investment return. Briefly defined, the internal rate of return is that rate which makes discounted costs equal the discounted value of benefits. If we denote the benefits derived from the investment by B and costs by C and use subscript t to indicate the duration of the investment in time periods (years), then the internal rate of return r in the following equation is the percentage we wish to determine for the investment in question:

$$\sum_{t=0}^{n} \frac{C_t}{(1+r)^t} = \sum_{t=0}^{n} \frac{B_t}{(1+r)^t} \qquad (1)$$

If costs are incurred in a single time period ($t_o$), while benefits continue over a number of subsequent time periods ($t_1, t_2, \ldots, t_n$) the equation becomes:

$$C_o = \sum_{t=1}^{n} \frac{B_t}{(1+r)^t} \qquad (2)$$

and r becomes:

$$r = \sum_{t=1}^{n} B_t(1+r)^t - C_o = 0 \qquad (3)$$

The calculated rate of return (r) is then compared against a rate of interest (i) which measures the opportunity cost of the funds used in undertaking the investment. An investment is considered worthwhile so long as its rate of return r exceeds the rate of interest i. However, when a budget constraint exists, all investments with rates of return exceeding the rate of interest can be ranked in terms of their rates of return. The decision-makers then can adopt these investment options in order of their rates of return until the budget is exhausted. The rate of return criterion, therefore, does not only indicate whether an investment is worthwhile given a rate of interest, but also enables decision-makers faced with a budget constraint to determine the order in which investments should be undertaken.

*B. Measurement of Rates of Return - Description of the Procedure*

Rates of return on investment in any of the fourteen vocational programs were calculated for each of the eighteen schools. Separate calculations were done to distinguish between (1) the *private rate of return*, i.e., the rate of return to the trainee alone based on benefits and costs applicable to the trainee as an investor in himself or herself, and (2) the *social rate of return*, i.e., the rate of return to society in its investment in the vocational education of an individual, based on benefits derived and costs incurred by society at large. The existence of a positive social rate of return in this case indicates that the measured benefits (to whomever they accrue) outweigh the measured costs incurred by taxpayers at large.

In the calculation of *social* as well as *private* rates of return, two distinct measures of rates of return were computed on the basis of two assumptions as to the alternative to investment in vocational education at the 11th and 12th grade level. Under the first measure (*Rate of Return I*) rates of return were calculated on the assumption that except for enrollment in a vocational program, the individual would have dropped out of high school and entered the labor market upon completion of the 10th grade. *Rate of Return I*, therefore, views vocational education as an investment in high-school dropout prevention and the computed figure indicates the rate of return on that investment.

The second measure (*Rate of Return II*) indicates the rate of return on training in a vocational program *in lieu* of completing the 11th and 12th grades in an academic curriculum. The assumption in *Rate of Return II*, therefore, is that if the individual had not enrolled in a vocational program, he or she would have completed an academic high school education. In either case, it is assumed that the individual would not have attended college.

As Equation (3) shows, there are three elements in the calculation of the rate of return: *benefits*, *costs*, and *time* (the lifetime of the investment, i.e., the number of time periods during which the flow of benefits and costs is expected to occur).

Since all programs included in the study were one or two-year programs, all costs were considered to have been incurred in a single *time* period -- the initial time period $t_o$. The duration of the flow of benefits was considered differently under the two measures: Rate of Return I and Rate of Return II. All *costs* must be viewed as opportunity costs. That is, they represent the foregone opportunities which cannot be pursued due to undertaking a given economic activity. Thus, each of the cost categories represents the costs of foregone alternatives. They will be listed separately simply because different measurement problems tend to arise with each, not because they are theoretically different. As a measure of economic *benefits* from vocational education (as well as foregone benefits during training), the study uses earnings. Therefore it relies upon two indices: wage rates and the percent of time the trainee or graduate is employed.

The following is an explanation of how these three elements -- costs, benefits, and time -- were estimated for the calculation of social as well as private rates of return using both measures: Rate of Return I and Rate of Return II. Table 3 provides a convenient summary.

(i) Rate of Return I

Under the dropout assumption, vocational education is viewed as an investment in an individual who otherwise would have left school upon completion of the 10th grade and entered the labor market.

*The social rate of return* ($S_r$) was calculated using the following formula:

$$S_r = \sum_{t=1}^{n} SB_t \, (1+S_r) - SC_o = 0 \qquad (4)$$

where $S_r$ = the social rate of return
SC = social costs
SB = social benefits
n = 37 years for males (age 19 to 65)
= 34 years for females (age 19 to 62).

Social costs (SC) are costs of the investment to society at large. They include *direct costs* incurred by the school and *indirect costs* (opportunity costs of non-school inputs). Indirect costs represent the foregone earnings of the trainee and thus measure the value of output that the trainee would have contributed (for the duration of his

TABLE 3

COSTS AND BENEFITS OF VOCATIONAL EDUCATION

| SOCIAL | PRIVATE |
|---|---|
| 1. COSTS | 1. COSTS |
| Definition: opportunity costs to society at large (welfare foregone to society from the use of resources in the vocational program rather than in the production of other goods and services). | Definition: opportunity costs to the individual (welfare foregone to the individual from the use of resources in the vocational program rather than on other goods and services). |
| Components:<br>Rate of Return I | Components:<br>Rate of Return I |
| 1. Direct costs: costs incurred by the school in providing the specific vocational training:<br>a. current costs<br>b. capital costs | 1. Direct costs: costs incurred by the individual due to enrollment in the vocational program (e.g., books, tools). |
| 2. Indirect costs: opportunity costs of non-school inputs:<br>a. foregone earnings of the trainee during training | 2. Indirect costs: opportunity cost to the individual of enrollment in the vocational program<br>a. foregone earnings net of taxes |
| Rate of Return II | Rate of Return II |
| 1. Direct costs: costs incurred by the school in providing the specific vocational training over and above the cost that would have been incurred by an academic high school:<br>a. current costs<br>b. capital costs | 1. Direct costs: costs incurred by the individual due to enrollment in the vocational program (e.g., books, tools). |
| 2. BENEFITS | 2. BENEFITS |
| Definition: Welfare gained by society at large from the individual's training in the vocational program | Definition: Welfare gained by the individual from training in the vocational program |

Table 3 (con't)

| | |
|---|---|
| Components:<br>Rate of Return I<br><br>1. increased output attributable to the individual's training in the vocational program.<br><br>Rate of Return II<br><br>1. output attributable to the individual's training in the vocational program over and above the output that would have been realized had the individual completed an academic high school education. | Components:<br>Rate of Return I<br><br>1. increased earnings attributable to the individual's training in the vocational program.<br><br>Rate of Return II<br><br>1. earnings attributable to the individual's training in the vocational program over and above the earnings that would have been realized had the individual completed an academic high school education (net of taxes). |
| 3. TIME | 3. TIME |
| Definition: lifetime of the investment, i.e., the number of time periods during which the flow of benefits and costs is expected to occur. | Definition: lifetime of the investment, i.e., the number of time periods during which the flow of benefits and costs is expected to occur. |
| Components:<br>Rate of Return I<br><br>1. Costs considered to have been incurred in a single period (the initial time period $t_o$).<br><br>2. benefits considered to occur over the working lifetime of the individual (up to the age of 65 for males, 62 for females).<br><br>Rate of Return II<br><br>1. costs considered to have been incurred in a single period (the initial time period $t_o$).<br><br>2. benefits considered to occur over the five years following graduation from a vocational program. | Components:<br>Rate of Return I<br><br>1. costs considered to have been incurred in a single period (the initial time period $t_o$).<br><br>2. benefits considered to occur over the working lifetime of the individual (up to the age of 65 for males, 62 for females).<br><br>Rate of Return II<br><br>1. costs considered to have been incurred in a single period (the initial time period $t_o$).<br><br>2. benefits considered to occur over the five years following graduation from a vocational program. |

training) if he had entered the labor market rather than enrolled in a specific vocational program. This cost of foregone output was calculated by subtracting from the annual potential earnings as a high school dropout, the annual earnings from part-time employment during training and multiplying the difference by the number of years the trainee spent in the program. Potential dropout earnings were calculated by assuming an 80 percent employment rate at an hourly wage of $1.65 (the federal minimum wage). The annual earnings from part-time employment during training were calculated using questionnaire data supplied by trainees in each of the vocational programs and schools under study. The direct costs incurred by the school comprise *current costs* (operation and maintenance) and *capital costs* (costs of sites, buildings, and equipment). The school's total current costs per annum were calculated from the school's Cost Information Sheet (See Appendix A). The current cost of each vocational program was computed by allocating the school's total current costs on the basis of the ratio of the number of teachers in the program to the total number of teachers in the school. The average annual current cost (current costs per vocational program trainee) was then obtained by dividing the program's current costs by the number of trainees in the program. The average capital cost (capital cost per vocational trainee) per annum was calculated by first determining the school's annual capital depreciation (assuming a 25-year lifetime for buildings and a 10-year lifetime for equipment) and then dividing this figure by the average daily membership in the school. Finally, the average total cost (total cost per trainee) per annum was computed for each program by summing the per annum average current cost and average capital cost and multiplying the sum by the applicable number of years for each vocational program.

Social benefits (SB) were considered to be the difference between earnings as a graduate of a specific vocational program and average earnings as an individual with a 10th grade schooling over the working lifetime -- until age 65 for males and age 62 for females.

Benefits for the first year were calculated by subtracting estimated yearly earnings as a high school dropout with 10th grade education (at an hourly wage of $1.65 and an employment rate of 80%), from the average first year earnings for graduates of the specific vocational program. The latter figure was calculated from data obtained from actual wage and employment rates obtained from school follow-up studies, estimates provided by program instructors, and U.S. Employment Security Administration data.

For subsequent years, it was assumed that wage rates of vocational graduates increase at the rate of 3% per year, while wage rates of non-trainees increase at a higher rate so that the gap between earnings of high school dropouts and vocational high school graduates at the end of the working lifetime diminishes to 15 percent of its initial level. The rationale behind the assumption of a narrowing of earnings differential is the availability of on-the-job training and labor union effectiveness in wage-rate determination. For each sex and at each age,

earnings were then adjusted by multiplying potential earnings by probabilities for survival and of labor force participation as estimated by the U.S. Department of Labor.[1]

The *private rate of return* ($P_r$) was calculated using the following formula:

$$P_r = \sum_{t=1}^{n} PB_t(1+P_r) - PC_o = 0 \qquad (5)$$

where $P_r$ = the private rate of return, PC = private costs, PB = private benefits, and n = 37 years for males, 37 years for females.

Private costs (PC) are those incurred by an individual as an investor in himself or herself. They include (1) direct costs to the trainee and (2) the trainee's foregone earnings during training. Direct costs are expenses for tools and other out-of-pocket expenses attributable to enrollment in the vocational program. Data on these expenses were obtained from the participating schools and from trainees in the various vocational programs. Foregone earnings during training represent the trainee's opportunity cost of enrollment in the specific vocational program. This is the same foregone earnings figure used in the calculation of social costs except that it was computed net of Federal taxes on the basis of average tax rates, for the earnings range, under the Tax Reform Act of 1969 (See Table 4).

Private benefits (PB) differ from social benefits only in that earnings for each year were computed net of Federal taxes.

(ii) Rate of Return II

In this measure of the rate of return, vocational education is viewed as an investment in an individual alternative to investment in that individual in an academic high school.

*The social rate of return* ($S_r^*$) was calculated using the following formula:

$$S_r^* = \sum_{t=1}^{n} SB_t\ (1+S_r^*) - SC_o^* = 0 \qquad (6)$$

where $S_r^*$ = the social rate of return, SC* = social costs, SB* = social benefits, and n = 5 years.

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[1] See Stuart Garfinkle, *The Length of Working Life for Males 1900-1960*, Manpower Report No. 8, U.S. Department of Labor, July 1963; and *Work Life Expectancy and Training Needs of Women*, Manpower Report No. 12, U.S. Department of Labor, May 1967.

TABLE 4

EFFECTIVE RATES OF FEDERAL INDIVIDUAL INCOME TAX
(TAX REFORM ACT OF 1969)

| Annual Income (dollars) | Actual Tax Rate (percent) |
|---|---|
| -- 1500 | 0 |
| 1500 -- 2000 | 0.3 |
| 2000 -- 2500 | 1.5 |
| 2500 -- 3000 | 2.5 |
| 3000 -- 3500 | 3.3 |
| 3500 -- 4000 | 4.2 |
| 4000 -- 4500 | 5.0 |
| 4500 -- 5000 | 5.5 |
| 5000 -- 6000 | 6.2 |
| 6000 -- 7000 | 7.1 |
| 7000 -- 8000 | 7.3 |
| 8000 -- 9000 | 8.1 |
| 9000 -- 10,000 | 8.5 |
| 10,000 -- 11,000 | 9.2 |
| 11,000 -- 12,000 | 9.6 |
| 12,000 -- 13,000 | 10.1 |
| 13,000 -- 15,000 | 10.9 |
| 15,000 -- 20,000 | 11.9 |
| 20,000 -- 25,000 | 13.6 |

Social costs (SC*), the cost to society of investment in the individual, in this case amounts to the *difference* in cost to the public educational system of providing training in a particular vocational program and of providing education in an academic high school. Since the individual, as an academic high school student, would not have entered the labor market on a full-time basis, no loss of output (foregone earnings) results from enrollment in a vocational program. It was assumed that part-time earnings would be equally realized whether the individual were enrolled in a vocational or in an academic high school.

The *difference* in direct costs between vocational and academic education was calculated as follows: (1) the *difference* in average current costs per annum was calculated by *subtracting* the annual average current cost (current expenditures per pupil) in the school district in which the particular vocational school is located *from* the annual average current cost of the vocational program in question (calculated as shown under Rate of Return I). (2) the *difference* in annual average capital costs was calculated by *subtracting* the annual per pupil capital depreciation in the school district in which the particular vocational school is located *from* the annual average capital cost for the relevant vocational program (calculated as shown under Rate of Return I). The average *total social costs* were then calculated by multiplying the annual average direct school cost difference by the number of years the trainee spent in the vocational program.

Social benefits (SB*) were considered to be the difference between earnings of a graduate of a particular vocational program *and* earnings of an academic high school graduate. For the first year, estimated earnings of an academic high school graduate were based on a wage rate of $1.85 per hour and an employment rate of 80 percent. These earnings were then subtracted from the average earnings of the specific vocational program in the school to obtain the first year's benefits. An annual growth rate of 3 percent in the wage rate of the vocational graduate was assumed thereafter and a higher growth rate for the academic high school graduate such that the entire earnings differential was eliminated by the end of the fifth year following graduation. The rationale for this assumption is that since the number of years of schooling is virtually the same under both investment options, the earnings differential will be eliminated primarily through on-the-job training.

The *private rate of return* $P_r^*$ was calculated using the following formula:

$$P_r^* = \sum_{t=1}^{n} PB_t^* (1+P_r^*) - PC_o^* = 0 \qquad (7)$$

where $P_r^*$ = the private rate of return

$PC^*$ = the private costs

$PB^*$ = private benefits

$n^*$ = 5 years

No loss of earnings during training were included under this measure of the rate of return since the assumption is that the trainee would have been enrolled in an academic high school rather than have entered the labor market as in the case of Rate of Return I. The only private costs (PC*), therefore, are the trainee's direct costs: expenses for tools and other out-of-pocket expenses specifically attributable to enrollment in the vocational program.

Private benefits (PB*) were considered to be the difference between earnings as a vocational program graduate and earnings as an academic high school graduate. They are equivalent to social benefits SB* except for the tax adjustment.

# V

# CONTRIBUTIONS OF THE STUDY

## *A. The Results*

A computer program was written and executed in order to carry out the necessary calculations of rates of return. The computed *social* rates of return by program for each of the eighteen schools are shown in Table 5. The equivalent *private* rates of return appear in Table 6. In both of these tables, the numbering of schools was done randomly. Hence no association can be made between the school numbers and the order in which schools are listed in Table 1.

The overall picture is that investment by individuals and by society at large in these vocational programs is worthwhile. This conclusion is based on the finding that median rates of return on investment in all but one of the vocational programs studied exceed the rate of interest reflecting the opportunity cost of the resources used in vocational education. While there is no uniquely correct figure for such an interest rate, the rates that have been used in cost-benefit analyses for federal government projects have generally varied from 3 percent to a maximum of 12 percent.[1] Tables 7 and 8 show the median social and private rates of return, using both measures Rate of Return I and Rate of Return II. All programs, except Child Care, show positive rates of return. The Food Preparation program shows relatively lower rates of return than the other twelve programs, but in the case of males remains unequivocably a worthwhile investment. In the case of females, the median social rate of return on investment in Food Preparation is 9.3 percent (assuming vocational education is an alternative to academic high school education).

In all programs, with the exception of General Merchandise, median rates of return are higher in the case of males than of females. This is principally due to the higher expected labor force participation rate by males and consequently higher estimated output and earnings over the lifetime of the investment. The exception in General Merchandise is attributable to the higher earnings from part-time employment while in training and consequently the lower foregone earnings for females in that program.

Median private rates of return are higher than median social rates of return. This is because private costs are substantially less than social costs (which include direct school costs) while social benefits are only marginally higher than private benefits -- only by the estimated tax payments on earnings.

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[1] It has been estimated that between 1961-65 the rate of return in the private sector ranged from 4.1% for railroads to 15.4% for manufacturing firms. See Jacob A. Stockfisch, "The Interest Rate Applicable to Government Investment Projects", in Hearings before the Subcommittee on Economy in Government, Joint Economic Committee, 90th Congress, 1st Session (Washington, D. C.: U.S. Government Printing Office, 1967), p. 137.

TABLE 5

SOCIAL RATES OF RETURN
BY PROGRAM AND SCHOOL

| PROGRAM | SCHOOL | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) | (13) | (14) | (15) | (16) | (17) | (18) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| WELDING | | | | | | | | | | | | | | | | | | | |
| Rate of Return I | | 60.2% | 73.6% | 66.3% | 86.2% | 70.3% | 101.1% | 57.5% | | 47.6% | 66.7% | 82.4% | 85.9% | | 80.0% | | | 433.6% | 123.8% |
| Rate of Return II | | 373.2 | 147.3 | 121.1 | 218.0 | 172.1 | 75.1 | 133.4 | | 82.0 | 201.0 | 220.2 | 209.0 | | 289.9 | | | * | 440.5 |
| AUTOMOTIVE MECHANICS | | | | | | | | | | | | | | | | | | | |
| Rate of Return I | | 48.0 | 72.4 | 57.3 | 62.3 | 54.1 | 29.6 | 55.5 | 62.0 | 38.9 | 89.4 | 66.8 | 49.1 | 101.5 | 63.1 | 63.8 | | 210.0 | 91.7 |
| Rate of Return II | | 268.1 | 135.3 | 98.4 | 190.7 | 142.5 | 8.8 | 110.1 | 221.1 | 73.1 | 380.5 | 210.6 | 154.4 | * | 265.0 | 240.0 | | * | 465.9 |
| AUTO BODY REPAIR | | | | | | | | | | | | | | | | | | | |
| Rate of Return I | | 51.8 | 55.8 | 47.8 | 76.5 | 62.8 | 28.4 | 53.6 | 154.4 | 35.0 | 80.7 | 72.4 | 38.6 | | | | | 155.0 | 72.9 |
| Rate of Return II | | 196.7 | 135.5 | 77.5 | 150.2 | 142.6 | -7.9 | 64.1 | 479.7 | 54.2 | 278.3 | 120.9 | 133.0 | | | | | * | * |
| MACHINE SHOP | | | | | | | | | | | | | | | | | | | |
| Rate of Return I | | 68.3 | 67.3 | 62.7 | 64.1 | 73.9 | 33.8 | 55.6 | 89.2 | 55.1 | 94.6 | 73.3 | 73.6 | 146.6 | 62.8 | 85.9 | | 80.0 | 80.4 |
| Rate of Return II | | 301.1 | 121.9 | 142.6 | 252.2 | 164.4 | 5.7 | 82.5 | * | 98.0 | 317.9 | 257.6 | 259.1 | * | 256.9 | * | | * | 453.1 |
| DRAFTING | | | | | | | | | | | | | | | | | | | |
| Rate of Return I-males | | 44.1 | 65.2 | 73.1 | 54.1 | 53.8 | 34.2 | 58.4 | 55.1 | 40.2 | 70.1 | 71.3 | 54.0 | 99.0 | | 65.8 | | 200.3 | 97.0 |
| -females | | 29.9 | 49.3 | 59.9 | 38.1 | 38.4 | 20.1 | 41.9 | 38.5 | 24.1 | 58.6 | 57.3 | 35.9 | 95.5 | | 54.7 | | 102.7 | 91.0 |
| Rate of Return II-males | | 199.6 | 97.7 | 194.6 | 100.7 | 112.7 | 19.3 | 117.7 | 140.8 | 28.4 | 436.1 | 213.7 | 249.4 | * | | 158.9 | | * | 345.4 |
| -females | | 113.9 | 45.9 | 110.6 | 48.0 | 56.0 | -8.0 | 59.4 | 74.8 | -1.7 | 269.4 | 123.3 | 146.8 | * | | 86.9 | | * | 210.0 |
| COSMETOLOGY | | | | | | | | | | | | | | | | | | | |
| Rate of Return I | | 7.9 | 19.4 | 11.2 | 13.0 | 20.0 | 3.6 | 16.6 | 20.3 | 13.8 | 21.8 | 20.6 | 13.3 | 14.4 | | 13.1 | 23.9 | | 15.0 |
| Rate of Return II | | 21.4 | 44.8 | -16.3 | 7.1 | 26.0 | - | 9.6 | 123.6 | 6.3 | 99.7 | 42.9 | 17.5 | 36.9 | | 53.7 | 474.6 | | 40.3 |
| AGRICULTURAL MECHANICS | | | | | | | | | | | | | | | | | | | |
| Rate of Return I | | 44.0 | 44.0 | 25.6 | 51.7 | 40.9 | 23.8 | 29.6 | 42.0 | 29.3 | 40.5 | 33.5 | | | | | | | |
| Rate of Return II | | 262.6 | 273.1 | -7.0 | 108.0 | 47.9 | -2.8 | 35.2 | 109.5 | 27.1 | 154.2 | 44.1 | | | | | | | |
| AGRICULTURAL PRODUCTION | | | | | | | | | | | | | | | | | | | |
| Rate of Return I-males | | | | 37.8 | | | | 37.6 | 98.7 | | | | | | | 51.6 | | | |
| -females | | | | 25.4 | | | | 25.1 | 168.9 | | | | | | | 42.7 | | | |
| Rate of Return II-males | | | | 49.7 | | | | 40.7 | * | | | | | | | * | | | |
| -females | | | | 13.1 | | | | 6.9 | * | | | | | | | * | | | |

TABLE 5 (Contd.)

SOCIAL RATES OF RETURN
BY PROGRAM AND SCHOOL

| PROGRAM | SCHOOL | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) | (13) | (14) | (15) | (16) | (17) | (18) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| STENO & SECRETARIAL | | | | | | | | | | | | | | | | | | | |
| Rate of Return I | | 16.3 | 20.2 | 18.2 | 22.5 | 26.8 | 9.4 | 20.6 | 31.3 | 18.9 | 29.0 | 28.0 | | + | 78.8 | 32.6 | 80.9 | | 37.6 |
| Rate of Return II | | 60.5 | 25.0 | 2.0 | 27.0 | 71.2 | - | 22.9 | 61.9 | 15.2 | 114.7 | 53.5 | | + | + | + | + | | + |
| GENERAL OFFICE | | | | | | | | | | | | | | | | | | | |
| Rate of Return I-males | | | 32.0 | 31.0 | | 32.2 | 17.2 | 25.5 | 43.6 | 50.1 | | 33.7 | 254.2 | | | 34.9 | 63.1 | | 39.5 |
| -females | | | 19.0 | 18.7 | | 19.5 | 7.9 | 13.7 | 33.5 | 31.6 | | 21.5 | + | | | 23.6 | 56.9 | | 27.7 |
| Rate of Return II-males | | | 71.3 | 41.4 | | 88.5 | -18.5 | 31.3 | 269.3 | 86.1 | | 87.0 | 185.1 | | | + | - | | + |
| -females | | | 28.0 | 7.4 | | 39.6 | - | 0.3 | 160.0 | 38.1 | | 38.6 | 104.3 | | | + | + | | + |
| ACCOUNTING | | | | | | | | | | | | | | | | | | | |
| Rate of Return I-males | | 29.1 | 41.6 | 57.9 | 60.6 | 29.2 | | 35.6 | 46.4 | 32.7 | 36.2 | | | | | 33.4 | | | 39.6 |
| -females | | 19.0 | 29.4 | 59.7 | 18.4 | 17.5 | | 21.2 | 38.2 | 20.8 | 24.9 | | | | | 22.5 | | | 27.7 |
| Rate of Return II-males | | 104.2 | 93.8 | 45.1 | 9.4 | 39.9 | | 72.2 | 302.2 | 133.0 | 76.2 | | | | | 319.4 | | | + |
| -females | | 50.3 | 43.3 | 9.9 | -15.0 | 6.4 | | 28.6 | 181.6 | 69.6 | 31.3 | | | | | 192.9 | | | + |
| GENERAL MERCHANDISE | | | | | | | | | | | | | | | | | | | |
| Rate of Return I-males | | 108.6 | 108.6 | 133.8 | 204.3 | 33.4 | 104.9 | 361.0 | 42.8 | 80.9 | | 53.5 | | 49.0 | 102.4 | 430.4 | 48.7 | | |
| -females | | 140.7 | 140.7 | 176.8 | + | 23.2 | 130.4 | + | 55.2 | 64.7 | | 49.5 | | 42.1 | 124.0 | + | 46.2 | | |
| Rate of Return II-males | | 182.0 | 182.0 | 68.2 | 321.8 | 31.8 | 11.0 | 114.2 | 74.9 | 58.6 | | 96.3 | | + | 187.5 | + | + | | |
| -females | | 102.3 | 102.3 | 25.9 | 194.5 | .8 | -13.8 | 57.0 | 30.4 | 19.3 | | 45.0 | | + | 109.5 | + | + | | |
| FOOD PREPARATION | | | | | | | | | | | | | | | | | | | |
| Rate of Return I-males | | 22.7 | 22.7 | 20.3 | 30.9 | 21.3 | 13.2 | 30.6 | 25.8 | 16.5 | 30.3 | 24.6 | | 30.3 | | | 84.5 | | |
| -females | | 12.9 | 12.9 | 10.1 | 19.1 | 11.4 | 5.0 | 19.6 | 14.8 | 7.3 | 20.4 | 13.7 | | 18.5 | | | 113.1 | | |
| Rate of Return II-males | | 145.0 | 152.8 | -10.9 | 60.5 | 18.4 | - | 29.9 | 82.6 | -16.4 | 44.2 | 33.0 | | + | | | + | | |
| -females | | 77.6 | 82.9 | - | 20.6 | -8.7 | - | -.6 | 35.7 | - | 9.3 | 1.5 | | + | | | + | | |
| CHILD CARE | | | | | | | | | | | | | | | | | | | |
| Rate of Return I | | - | | -5.6 | -4.8 | -5.2 | | | | | -.3 | -5.1 | | | | | + | | |
| Rate of Return II | | - | | - | - | - | | | | | - | - | | | | | 62.1 | | |

- indicates a negative rate of return too low to calculate

+ indicates a positive rate of return too high to calculate

No entry indicates the program was not offered

TABLE 6

PRIVATE RATES OF RETURN

BY PROGRAM AND SCHOOL

| PROGRAM | SCHOOL (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) | (13) | (14) | (15) | (16) | (17) | (18) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| WELDING | | | | | | | | | | | | | | | | | | |
| Rate of Return I | 104.1 | 270.3 | 165.8 | 210.3 | 153.8 | + | 118.2 | | 105.4 | 132.4 | 201.3 | 246.9 | | 218.0 | | | + | 340.1 |
| Rate of Return II | + | + | + | + | + | + | + | | + | + | 224.0 | + | | + | | | + | + |
| AUTOMOTIVE MECHANICS | | | | | | | | | | | | | | | | | | |
| Rate of Return I | 76.6 | 281.7 | 139.0 | 123.6 | 112.5 | 67.7 | 136.7 | 115.1 | 73.1 | 321.4 | 150.3 | 92.3 | 292.5 | 116.5 | 126.6 | | + | 196.7 |
| Rate of Return II | 366.2 | 491.6 | 423.2 | + | + | 309.0 | + | + | + | + | + | 403.3 | + | 401.9 | 311.3 | | + | + |
| AUTO BODY REPAIR | | | | | | | | | | | | | | | | | | |
| Rate of Return I | 98.7 | 131.4 | 107.4 | 274.4 | 165.0 | 106.2 | 215.6 | + | 66.9 | 266.7 | 326.1 | 64.8 | | | | | 451.0 | 118.5 |
| Rate of Return II | 273.7 | + | + | + | + | 382.2 | + | + | 468.3 | + | + | 398.1 | | | | | + | + |
| MACHINE SHOP | | | | | | | | | | | | | | | | | | |
| Rate of Return I | 127.0 | 171.2 | 131.3 | 106.3 | 249.7 | 100.0 | 161.4 | 152.7 | 127.0 | 462.8 | 172.2 | 130.6 | + | 113.3 | 163.1 | | 126.6 | 146.9 |
| Rate of Return II | 443.2 | + | + | + | + | 360.8 | + | + | + | + | + | + | + | + | 449.4 | | + | + |
| DRAFTING | | | | | | | | | | | | | | | | | | |
| Rate of Return I- males | 71.3 | 273.8 | 184.1 | 116.2 | 124.4 | 84.5 | 147.2 | 106.0 | 120.6 | 151.2 | 158.3 | 86.3 | 339.6 | | 186.8 | | 178.0 | 226.5 |
| -females | 71.3 | + | + | 158.7 | 198.9 | 100.1 | 276.7 | 124.6 | 170.2 | 372.0 | 352.5 | 77.6 | + | | + | | 602.6 | + |
| Rate of Return II-males | + | + | + | + | + | + | + | + | + | + | + | + | + | | + | | + | + |
| -females | + | + | + | + | + | 495.2 | + | + | + | + | + | + | + | | + | | + | + |
| COSMETOLOGY | | | | | | | | | | | | | | | | | | |
| Rate of Return I | 18.0 | 52.3 | 39.8 | 33.7 | 61.6 | 18.7 | 51.8 | 47.0 | 44.4 | 54.4 | 49.9 | 39.8 | 40.2 | | 30.9 | 44.7 | | 33.9 |
| Rate of Return II | 163.4 | 373.1 | 285.3 | 302.0 | 431.8 | 76.3 | 364.1 | + | 285.1 | + | 255.3 | + | 464.8 | | 69.7 | 286.0 | | 348.5 |
| AGRICULTURAL MECHANICS | | | | | | | | | | | | | | | | | | |
| Rate of Return I | 67.1 | 67.1 | 74.3 | 105.3 | 117.3 | 51.2 | 68.2 | 100.7 | 60.0 | 74.3 | 69.1 | | | | | | | |
| Rate of Return II | 307.6 | 307.6 | 285.5 | + | + | 241.0 | + | - | 345.1 | + | 224.0 | | | | | | | |
| AGRICULTURAL PRODUCTION | | | | | | | | | | | | | | | | | | |
| Rate of Return I-males | | | 98.2 | | | | 114.8 | 280.3 | | | | | | | 85.1 | | | |
| -females | | | 197.4 | | | | 378.0 | + | | | | | | | 129.7 | | | |
| Rate of Return II-males | | | + | | | | + | + | | | | | | | + | | | |
| -females | | | + | | | | + | + | | | | | | | + | | | |

TABLE 6 (Contd.)

PRIVATE RATES OF RETURN
BY PROGRAM AND SCHOOL

| PROGRAM | SCHOOL | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) | (13) | (14) | (15) | (16) | (17) | (18) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| STENO & SECRETARIAL | | | | | | | | | | | | | | | | | | | |
| Rate of Return I | | 39.1 | 64.1 | 69.8 | 68.2 | 68.9 | 44.5 | 59.0 | 112.7 | 56.9 | 71.2 | 79.7 | | + | 170.8 | 97.7 | + | | 79.2 |
| Rate of Return II | | + | + | + | + | + | + | + | + | + | + | + | | + | + | + | + | | + |
| GENERAL OFFICE | | | | | | | | | | | | | | | | | | | |
| Rate of Return I-males | | | 64.1 | 65.6 | | 57.2 | 41.5 | 50.7 | 85.2 | 94.1 | | 63.6 | + | | | 54.2 | 140.7 | | 57.4 |
| -females | | | 64.6 | 74.8 | | 54.6 | 38.1 | 45.2 | 151.8 | 86.2 | | 70.3 | + | | | 55.2 | + | | 54.9 |
| Rate of Return II-males | | | + | + | | + | + | + | + | + | | + | + | | | + | + | | + |
| -females | | | + | + | | + | 396.7 | + | + | + | | + | + | | | + | + | | + |
| ACCOUNTING | | | | | | | | | | | | | | | | | | | |
| Rate of Return I-males | | 54.3 | 112.9 | + | 87.7 | 61.7 | | 68.4 | 97.4 | 58.6 | 83.6 | | | | | 56.5 | | | 57.1 |
| -females | | 67.4 | 318.1 | + | 157.7 | 71.6 | | 64.2 | 276.3 | 62.4 | 155.4 | | | | | 63.7 | | | 57.9 |
| Rate of Return II-males | | + | + | + | + | + | | + | + | + | + | | | | | + | | | + |
| -females | | + | + | + | + | + | | + | + | + | + | | | | | + | | | + |
| GENERAL MERCHANDISE | | | | | | | | | | | | | | | | | | | |
| Rate of Return I-males | | + | + | + | + | 103.9 | + | + | 136.4 | + | | 254.9 | 56.5 | 91.3 | + | + | 100.8 | | |
| -females | | + | + | + | + | + | + | + | + | + | | + | 59.4 | 210.8 | + | + | + | | |
| Rate of Return II-males | | + | + | + | + | + | + | + | + | + | | + | + | + | + | + | + | | |
| -females | | + | + | + | + | + | + | + | + | + | | + | + | + | + | + | + | | |
| FOOD PREPARATION | | | | | | | | | | | | | | | | | | | |
| Rate of Return I-males | | 35.5 | 35.5 | 54.7 | 55.8 | 41.1 | 44.9 | 86.7 | 43.0 | 40.0 | 74.8 | 46.5 | | 48.6 | | | 428.1 | | |
| -females | | 30.1 | 30.1 | 63.4 | 57.8 | 37.9 | 48.6 | 220.8 | 37.3 | 35.5 | 178.1 | 43.5 | | 44.1 | | | + | | |
| Rate of Return II-males | | - | - | + | + | + | + | + | + | + | + | + | | + | | | + | | |
| -females | | - | - | + | + | 385.1 | + | + | + | + | + | + | | + | | | + | | |
| CHILD CARE | | | | | | | | | | | | | | | | | | | |
| Rate of Return I | | - | - | -.7 | -1.5 | -0.2 | | | | | 18.6 | -1.2 | | | | | + | | |
| Rate of Return II | | - | - | - | - | - | | | | | - | - | | | | | - | | |

- indicates a negative rate of return too low to calculate

+ indicates a positive rate of return too high to calculate

No entry indicates the program was not offered

TABLE 7

MEDIAN SOCIAL RATES OF RETURN BY PROGRAM

| | Rate of Return I | | Rate of Return II | |
|---|---|---|---|---|
| | males | females | males | females |
| WELDING | 76.8% | | 214.5% | |
| AUTOMOTIVE MECHANICS | 62.3 | | 210.6 | |
| AUTO BODY REPAIR | 59.3 | | 139.1 | |
| MACHINE SHOP | 73.3 | | 257.6 | |
| DRAFTING | 61.8 | 45.6% | 176.8 | 98.8% |
| COSMETOLOGY | | 14.7 | | 31.5 |
| AGRICULTURAL MECHANICS | 40.5 | | 47.9 | |
| AGRICULTURAL PRODUCTION | 44.7 | 34.1 | 49.7 | 13.1 |
| STENOGRAPHY & SECRETARIAL | | 27.4 | | 61.2 |
| GENERAL OFFICE | 34.3 | 22.6 | 86.6 | 39.1 |
| ACCOUNTING | 35.6 | 22.5 | 93.8 | 43.3 |
| GENERAL MERCHANDISE | 103.7 | 127.2 | 148.1 | 79.7 |
| FOOD PREPARATION | 24.6 | 13.7 | 44.2 | 9.3 |
| CHILD CARE | | -5.1 | | - |

- rate of return too low to calculate

TABLE 8

MEDIAN PRIVATE RATES OF RETURN BY PROGRAM

| | Rate of Return I | | Rate of Return II | |
|---|---|---|---|---|
| | males | females | males | females |
| WELDING | 205.8% | | + | |
| AUTOMOTIVE MECHANICS | 126.6 | | + | |
| AUTO BODY REPAIR | 148.2 | | + | |
| MACHINE SHOP | 146.9 | | + | |
| DRAFTING | 149.2 | 314.6% | + | + |
| COSMETOLOGY | | 42.3 | | 285.7% |
| AGRICULTURAL MECHANICS | 71.7 | | 326.4% | |
| AGRICULTURAL PRODUCTION | 106.5 | 287.7 | + | + |
| STENOGRAPHY & SECRETARIAL | | 70.5 | | + |
| GENERAL OFFICE | 63.9 | 67.5 | + | + |
| ACCOUNTING | 68.4 | 71.6 | + | + |
| GENERAL MERCHANDISE | + | + | + | + |
| FOOD PREPARATION | 47.6 | 46.4 | + | + |
| CHILD CARE | | -1.2 | | - |

\+ rate of return too high to calculate

\- rate of return too low to calculate

TABLE 9

RANKING OF PROGRAMS BY MEDIAN RATE OF RETURN
(Rate of Return I)

| | Ranking by Median Rate of Return | |
|---|---|---|
| | males | females |
| WELDING | 2 | |
| AUTOMOTIVE MECHANICS | 4 | |
| AUTO BODY REPAIR | 6 | |
| MACHINE SHOP | 3 | |
| DRAFTING | 5 | 2 |
| COSMETOLOGY | | 7 |
| AGRICULTURAL MECHANICS | 8 | |
| AGRICULTURAL PRODUCTION | 7 | 3 |
| STENOGRAPHY & SECRETARIAL | | 4 |
| GENERAL OFFICE | 10 | 5 |
| ACCOUNTING | 9 | 6 |
| GENERAL MERCHANDISE | 1 | 1 |
| FOOD PREPARATION | 11 | 8 |
| CHILD CARE | | 9 |

Table 9 ranks all programs by the median rate of return (Rate of Return 1). Of the five areas of training, distributive education service (as represented by General Merchandise, with a median social rate of return of 103.7% for males and 127.2% for females) has the highest median rate of return. The primary reason for this is the low cost of General Merchandise programs: they are predominantly one-year programs with a high trainee-instructor ratio and therefore have low direct school costs. Foregone earnings are also low for the General Merchandise program, because of the relatively high earnings by trainees from part-time employment during training. The training area with the second highest rates of return is trade and industrial service. Within this area, Welding with 76.8% has the highest median social rate of return, followed by Machine Shop (73.3%), Automotive Mechanics (62.3%), Drafting (61.8% for males, 45.6% for females), Auto Body Repair (59.3%) and finally Cosmetology with 14.7%. The Agricultural Service training area ranks third with agricultural production (44.7% for males and 34.1% for females) having a higher median social rate of return than Agricultural Mechanics (40.5%). Business Office Education ranks fourth among the training areas, with Accounting (35.6% for males, 22.5% for females), General Office (34.3% for males, 22.6% for females), and Stenography and Secretarial (27.4%). The Home Economics training area ranks lowest with food preparation (24.6% for males, 13.7% for females), trailed by child care -- the only vocational program studied that yielded a negative median rate of return (a -5.1% social Rate of Return I).

Within these overall results, the rates of return vary by program among the eighteen schools as well as between programs within each school. This is shown in Tables 10 and 11. In Table 10, social rates of return are ranked by program for each of the eighteen schools. It shows the relative "social" profitability of the programs for each school, e.g., for School No. 8, the Auto Body Repair program ranks first followed by Agricultural Production (Rank 2), Machine Shop (Rank 3), Automotive Mechanics (Rank 4), with Cosmetology at the end of the scale with Rank 12. Table 11 ranks schools by rates of return on each program, e.g., in Agricultural Mechanics, School No. 4 had the highest rate of return followed by Schools No. 1 and No. 2, then School No. 8, with School No. 6 having the lowest rate of return on this program.

While there is a general consistency in the rate-of-return ranking, certain divergences are evident. Analysis of these divergences should be considered in terms of the elements that go into the calculation of benefits and costs for each program and school. Benefits are measured in terms of additional earnings attributable to vocational education. Differences in benefits of the same program among schools (as well as differences in benefits between programs within the same school) are due to variations in wage and employment rates of graduates. Table 12 shows average social benefits (under Rate of Return 1) by school and program.

Differences in costs by school and program are somewhat less self-explanatory. In the calculation of Rate of Return 1, two factors contribute to differences in social costs -- the schools' direct (current and capital) costs and the foregone earnings of trainees while in

TABLE 10

RANKING OF SOCIAL RATES OF RETURN

BY PROGRAM

| PROGRAM \ SCHOOL | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) | (13) | (14) | (15) | (16) | (17) | (18) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| WELDING | 3 | 2 | 3 | 2 | 2 | 2* | 3 | | 4 | 5 | 1 | 2 | | 2 | | | 1 | 1 |
| AUTOMOTIVE MECHANICS | 5 | 3 | 6 | 5 | 4 | 5 | 5 | 4 | 6 | 2 | 5 | 5 | 3 | 4 | 4 | | 2 | 3 |
| AUTO BODY REPAIR | 4 | 6 | 7 | 3 | 3 | 6 | 6 | 1 | 7 | 3 | 3 | 6 | | | | | 3 | 5 |
| MACHINE SHOP | 2 | 4 | 4 | 4 | 1 | 4 | 4 | 3 | 2 | 1 | 2 | 3 | 2 | 5 | 2 | | 5 | 4 |
| DRAFTING | 6 | 5 | 2 | 6 | 5 | 3 | 2 | 5 | 5 | 4 | 4 | 4 | 4 | | 3 | | 4 | 2 |
| COSMETOLOGY | 11 | 12 | 13 | 11 | 12 | 11 | 13 | 12 | 12 | 10 | 11 | 8 | 7 | | 9 | 6 | | 9 |
| AGRICULTURAL MECHANICS | 7 | 7 | 10 | 7 | 6 | 7 | 10 | 9 | 9* | 6 | 8 | | | | | | | |
| AGRICULTURAL PRODUCTION | | | 8 | | | | 7 | 2 | | | | | | | 5 | | | |
| STENO & SECRETARIAL | 10 | 11 | 12 | 10 | 10 | 10 | 12 | 10 | 10 | 9 | 9 | 0 | 1 | 3* | 8 | 3 | | 8 |
| GENERAL OFFICE | | 9 | 9 | | 8 | 8 | 11 | 7 | 3* | | 7 | 1* | | | 6 | 4 | | 7 |
| ACCOUNTING | 8 | 8 | 5 | 9 | 9 | 0 | 8 | 6 | 8 | 7 | | | | | 7 | | | 6 |
| GENERAL MERCHANDISE | 1* | 1* | 1* | 1* | 7* | 1* | 1* | 8 | 1 | | 6 | 7 | 5 | 1* | 1* | 5 | | |
| FOOD PREPARATION | 9 | 10 | 11 | 8 | 11 | 9 | 9 | 11 | 11* | 8 | 10 | | 6 | | | 2 | | |
| CHILD CARE | 12 | | 14 | 12 | 13 | | | | | 11* | 12 | | | | | 1 | | |

* indicates a one-year program

TABLE 11

RANKING OF SOCIAL RATES OF RETURN

BY SCHOOL

| PROGRAM / SCHOOL | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) | (13) | (14) | (15) | (16) | (17) | (18) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| WELDING | 12 | 8 | 11 | 4 | 9 | 3* | 13 | | 14 | 10 | 6 | 5 | | 7 | | | 1 | 2 |
| AUTOMOTIVE MECHANICS | 15 | 5 | 11 | 9 | 13 | 17 | 12 | 10 | 16 | 4 | 6 | 14 | 2 | 8 | 7 | | 1 | 3 |
| AUTO BODY REPAIR | 10 | 8 | 11 | 4 | 7 | 14 | 9 | 2 | 13 | 3 | 6 | 12 | | | | | 1 | 5 |
| MACHINE SHOP | 10 | 11 | 14 | 12 | 7 | 17 | 15 | 4 | 16 | 2 | 9 | 8 | 1 | 13 | 5 | | 6 | 3 |
| DRAFTING | 14 | 8 | 4 | 11 | 13 | 16 | 9 | 10 | 15 | 6 | 5 | 12 | 2 | | 7 | | 1 | 3 |
| COSMETOLOGY | 15 | 6 | 14 | 13 | 5 | 16 | 7 | 4 | 10 | 2 | 3 | 11 | 9 | | 12 | 1 | | 8 |
| AGRICULTURAL MECHANICS | 2 | 2 | 10 | 1 | 5 | 11 | 8 | 4 | 9* | 6 | 7 | | | | | | | |
| AGRICULTURAL PRODUCTION | | | 3 | | | | 4 | 1 | | | | | | | 2 | | | |
| STENO & SECRETARIAL | 15 | 12 | 14 | 10 | 9 | 16 | 11 | 6 | 13 | 7 | 8 | | 1 | 3* | 5 | 2 | | 4 |
| GENERAL OFFICE | | 9 | 10 | | 8 | 12 | 11 | 4 | 3* | | 7 | 1* | | | 6 | 2 | | 5 |
| ACCOUNTING | 11 | 3 | 1 | 9 | 10 | | 6 | 2 | 8 | 5 | | | | | 7 | | | 4 |
| GENERAL MERCHANDISE | 5* | 5* | 4* | 3* | 14* | 7* | 2* | 13 | 9 | | 10 | | 11 | 8* | 1* | 12 | | |
| FOOD PREPARATION | 8 | 8 | 11 | 2 | 10 | 13 | 3 | 6 | 12 | 4 | 7 | | 4 | | | 1 | | |
| CHILD CARE | 7 | | 6 | 3 | 5 | | | | | 2 | 4 | | | | | 1 | | |

* indicates a one-year program

TABLE 12

AVERAGE SOCIAL BENEFITS
(RATE OF RETURN I)
BY SCHOOL AND PROGRAM

| PROGRAM \ SCHOOL | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) | (13) | (14) | (15) | (16) | (17) | (18) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| WELDING | $3070 | $3363 | $3825 | $3703 | $4068 | $3071* | $3898 | | $3241 | $4068 | $3898 | $4068 | | $3046 | | | $4555 | $4166 |
| AUTOMOTIVE MECHANICS | 2414 | 3095 | 2852 | 2973 | 3071 | 2414 | 3046 | 2998 | 2779 | 3071 | 3046 | 2681 | 3217 | 2852 | 2681 | | 3363 | 3144 |
| AUTO BODY REPAIR | 2195 | 3022 | 2754 | 2730 | 3046 | 2195 | 2827 | 2584 | 2560 | 3046 | 2827 | 2438 | | | | | 3338 | 3046 |
| MACHINE SHOP | 2949 | 3095 | 3922 | 3582 | 3095 | 2949 | 3241 | 4555 | 3363 | 3095 | 3241 | 4409 | 4847 | 3071 | 3241 | | 3387 | 4263 |
| DRAFTING | 2584 | 3460 | 3338 | 3168 | 3046 | 2584 | 3363 | 3338 | 3265 | 3046 | 3363 | 3776 | 3582 | | 2852 | | 3338 | 3665 |
| COSMETOLOGY | 1099 | 2292 | 1635 | 1513 | 2122 | 1099 | 2219 | 1927 | 2073 | 2122 | 2219 | 1635 | 2122 | | 1294 | 2365 | | 1635 |
| AGRICULTURAL MECHANICS | 2292 | | 2292 | 2852 | 2292 | 2292 | 1878 | 1878* | 2219 | 2292 | 1878 | | | | | | | |
| AGRICULTURAL PRODUCTION | | | 2122 | | | | 2122 | 2122 | | | | | | | 2122 | | | |
| STENO & SECRETARIAL | 1757 | 2706 | 2316 | 2243 | 2803 | 1757 | 2925 | 2560 | 2584 | 2803 | 2925 | | 2779 | 2803* | 1976 | 3095 | | 2584 |
| GENERAL OFFICE | | 2245 | 2024 | | 2122 | 1538 | 2024 | 1951* | 2000 | | 2024 | 2073* | | | 1854 | 2365 | | 2122 |
| ACCOUNTING | 1538 | 2170 | 1805 | 2000 | 1878 | | 2681 | 1878 | 1927 | 1878 | | | | | 1757 | | | 2049 |
| GENERAL MERCHANDISE | 1416* | | 1732* | 1878* | 1635* | 1416* | 1878* | 1708 | 2000 | | 1878 | 1878 | 1878 | 1416* | 2633* | 1635 | | |
| FOOD PREPARATION | 1416 | | 1635 | 1878 | 1513 | 1416 | 1708 | 1708 | 1538 | 1513 | 1708 | | 1878 | | | 2122 | | |
| CHILD CARE | 4 | | 175 | 174 | 175 | | | | | 174 | 174 | | | | | 418 | | |

* indicates a one-year program

training. Under Rate of Return II, only the schools' direct costs are included. Current costs per trainee appear to be negatively related to the size of the program in each school. Similarly capital costs per trainee correlate negatively with the size of the school enrollment. Furthermore, in a few cases there were differences among schools in the period of training (i.e., one year vs. two-year plans) for certain programs. In all such cases, the lower cost for the one-year compared to the two-year plan exceeded the lower benefits resulting in greater rates of return for the one-year plan. Table 13 shows the median average total social cost (total cost per trainee) by program, as well as the lowest and highest figures.

This suggests that the average total cost (cost per vocational trainee) tends to be lower the larger the number of trainees in the program and the larger the average daily membership in the school. This hypothesis was tested using regression analysis. Statistically significant results were obtained in the case of three programs: Automotive Mechanics, Machine Shop, and Drafting. Table 14 presents an analysis of the regression equations. The negative signs of the coefficients for n and N indicate that lower average total cost (cost per vocational trainee) associated with larger number of trainees and lower average daily membership in the school. Hence the results of the regression analysis are consistent with the hypothesis that economies of scale exist at least in these three programs and that a substantial portion of the difference in average total costs between schools could be attributed to differences in program enrollment and school membership.

Foregone earnings also vary between schools and for different programs within each school depending upon earnings from part-time employment during training. In the three programs analyzed above, for example, the percentage of trainees with part-time earnings while in training varied among schools from 13% to 64% in Automotive Mechanics, from 21% to 59% in Machine Shop and from 7% to 54% in Drafting.

The combined effects of differences in the school's average total costs and in foregone earnings are reflected in social cost figures as calculated under Rate of Return I by school and program (See Table 15).

TABLE 13

MEDIAN AVERAGE TOTAL SOCIAL COST (Rate of Return I)
(TOTAL COST PER TRAINEE)
BY PROGRAM

| Program | Median ATC | Lowest ATC | Highest ATC |
|---|---|---|---|
| WELDING | $2,458.68 | $1,358,51 | $3,112.54 |
| AUTOMOTIVE MECHANICS | 2,100.88 | 1,305.34 | 3,530.04 |
| AUTO BODY REPAIR | 2,474,48 | 1,096.18 | 4,530.04 |
| MACHINE SHOP | 2,149.35 | 1,421.80 | 4,849.85 |
| DRAFTING | 2,376.20 | 1,249.76 | 4,325.32 |
| COSMETOLOGY | 2,402.06 | 1,842.04 | 3,826.48 |
| AGRICULTURAL PRODUCTION | 2,049.09 | 1,132.73 | 3,041.13 |
| AGRICULTURAL MECHANICS | 2,912.50 | 1,874.33 | 4,782.88 |
| STENOGRAPHY & SECRETARIAL | 2,367.33 | 1,563.04 | 3,919.51 |
| GENERAL OFFICE | 2,081.99 | 1,280.83* | 3,826.48 |
| ACCOUNTING | 2,522.69 | 1,739.78 | 3,308.69 |
| GENERAL MERCHANDISE | 1,459.87 | 920.08* | 2,225.92 |
| FOOD PREPARATION | 2,590.48 | 1,607.86 | 5,110.16 |
| CHILD CARE | 2,086.34 | 1,204.50* | 3,175.64 |

* indicates a one-year program

TABLE 14

ANALYSIS OF REGRESSION EQUATIONS
(LOG FORM)

Dependent Variable: ATC - average total social cost (cost per trainee) by school

Independent Variables: n - number of trainees in the program by school
N - average daily membership by school

| Program | Dependent Variable | Constant Term | Number of Trainees in the Program | Average daily Membership in the School | F-Ratio | Degrees of Freedom | $R^2$ |
|---|---|---|---|---|---|---|---|
| AUTOMOTIVE MECHANICS | ATC = | 4.286 | -0.2956***n (0.1432) | -0.1752**N (0.0775) | 5.28 | 15 | .643 |
| MACHINE SHOP | ATC = | 4.3768 | -0.3103***n (0.1694) | -0.2078**N (0.0935) | 4.18 | 15 | .598 |
| DRAFTING | ATC = | 4.4706 | -0.4498*n (0.1402) | -0.0767**N (0.0767) | 8.18 | 14 | .722 |

* Statistically significant at the .01 level
** Statistically significant at the .05 level
*** Statistically significant at the .10 level

TABLE 15

AVERAGE (PER TRAINEE) SOCIAL COSTS
(RATE OF RETURN I)
BY SCHOOL AND PROGRAM

| PROGRAM | SCHOOL (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) | (13) | (14) | (15) | (16) | (17) | (18) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| WELDING | $3949 | $3548 | $4475 | $3338 | $4488 | $2359* | $5248 | | $5248 | $4735 | $3673 | $3677 | | $2956 | | | $ 829 | $2975 |
| AUTOMOTIVE MECHANICS | 3874 | 3319 | 3847 | 3697 | 4386 | 6142 | 4244 | 3742 | 5462 | 2671 | 3534 | 4214 | 2464 | 3502 | 3259 | | 1240 | 3022 |
| AUTO BODY REPAIR | 3269 | 4187 | 4436 | 2770 | 3756 | 5813 | 4074 | 1298 | 5561 | 2933 | 3029 | 4828 | | | | | 1671 | 3603 |
| MACHINE SHOP | 3351 | 4603 | 4851 | 4331 | 3251 | 6626 | 4509 | 3965 | 4715 | 2544 | 3433 | 4647 | 2567 | 3787 | 2929 | | 3288 | 4062 |
| DRAFTING | 4506 | 4111 | 3544 | 4528 | 4377 | 5749 | 4459 | 4682 | 6215 | 3373 | 3661 | 4506 | 2812 | | 3360 | | 2587 | 3288 |
| COSMETOLOGY | 3771 | 4259 | 4487 | 3754 | 3857 | 5609 | 4638 | 3463 | 4939 | 3623 | 3938 | 3987 | 4014 | | 3204 | 3757 | 2002 | 4038 |
| AGRICULTURAL MECHANICS | 4007 | 330 | 6670 | 4260 | 4294 | 3086 | 4778 | 3433 | 5701* | 4343 | 4252 | | | | | | | |
| AGRICULTURAL PRODUCTION | | | 4283 | | | | 4308 | 1671 | | | | | 3070 | | 3176 | | | |
| TYPING AND SECRETARIAL | 3718 | 4679 | 4509 | 3732 | 4068 | 5423 | 5208 | 3231 | 4896 | 3824 | 4093 | | -87 | 1627* | 2452 | 1755 | 2002 | 3214 |
| GENERAL OFFICE | | 5308 | 4935 | | 4991 | 6364 | 5913 | 3435 | 3078* | | 4557 | 631* | | | 4040 | 2902 | | 4486 |
| ACCOUNTING | 3073 | 3997 | 2411 | 4035 | 4830 | | 5732 | 3116 | 4468 | 3961 | | | | | | 3090 | | 4253 |
| GENERAL MERCHANDISE | 1013* | -288* | 1005* | 712* | 1885* | 1040* | 401* | 3060 | 1920 | | 2712 | 4572 | 2597 | 1074* | 471* | 2585 | | |
| FOOD PREPARATION | 3528 | | 4803 | 3530 | 4121 | 6245 | 3149 | 3872 | 5527 | 2712 | 4095 | | 3616 | | | 883 | | |
| CHILD CARE | 3982 | | 1586 | 3848 | 4261 | | | | 1532 | 4205 | | | | | | -124 | | |

* indicates a one-year program

*B. Conclusions and Implications*

Vocational education, as all forms of education, has a multi-dimensional effect on the welfare of individuals and society. In the absence of a unique objective measure for this effect, earnings are used as a proxirate measure. Given that earnings are an appropriate index of the benefits of vocational education, the evidence based on results for the study sample and on assumptions of the analysis is that vocational education in Ohio is a worthwhile investment for individuals and for society. Two measures of the rate of return on investment in vocational education at the 11th and 12th grade level were used. The first measure evaluated vocational education as an investment in dropout prevention, i.e., rates of return (Rate of Return I) were calculated on investment in 11th and 12th grade level vocational education on the assumption that otherwise the trainee would have dropped out of school upon completion of the 10th grade. The second measure, Rate of Return II, evaluated high school vocational education as an investment in lieu of academic high school education. In this measure, rates of return were calculated on basis of differential costs and benefits of the two types of high school education.

The results of applying the two measures to 1970 data on eighteen schools and fourteen programs provide strong evidence that investment in these vocational programs is economically worthwhile. The magnitudes of the obtained rates of return leave no doubt about the advisability of maintaining, indeed expanding, these vocational programs in the state. In all but one of the vocational programs studied, median rates of return exceed the rate of interest reflecting the opportunity cost of the funds used. The program that fails to pass the test as an economically worthwhile investment may provide an illustration of the multi-dimensional aspects of vocational education. While the costs of investment in the Child Care program exceed the returns (in terms of increased potential earnings) there are perhaps indirect benefits associated with the acquisition of child care training-benefits that accrue to the family unit and to society as a whole through the role of the program graduate as a mother and a housemaker. The finding that this program is not a worthwhile investment merely indicates that the program costs outweigh the increase in *earnings*. To a certain extent, the same qualification applies to rates of return for females on the other home economics program studied -- Food Preparation.

In addition to the use of earnings as the index of returns from investment in vocational education, another qualification to the results of this study relates to the fact that future earnings were estimated on basis of the present structure of supply and demand for skills. Future structural changes, therefore, could alter the relative returns on investment in different programs.

Moreover, rates of return have been calculated on investment in vocational education at the high school level. No account was made for further investment in post-secondary technical training or college level

education. This is particularly relevant in the calculation of Rate of Return II. In this measure, investment in a vocational program was viewed as an alternative to investment in an academic high school education. The implicit assumption is that the option value of higher education is zero or the same in the case of both vocational and academic high school education. For those who intend to attend college the returns on vocational education as an alternative to academic high school education must be adjusted for any difference in the impact of the two types of education on the option value of higher education.

Inter-school and inter-program comparisons shed some light on the factors related to the efficient use of vocational education resources. The results of the study indicate distinct differences in rates of return between programs and schools. A substantial portion of inter-school variations in costs appear to be explained by size of programs (number of trainees) and of schools (average daily membership) -- a fact which points to the existence of economies of scale in the provision of vocational education, at least in some programs. The existence of economies of scale and the fact that many of the vocational programs studied are in their beginning stage suggest that there may be reductions in direct school costs per trainee in the future resulting from the more efficient use of the indivisible factor (capital) as program enrollments increase.

The cost structure of vocational programs is one area of research that can and ought to be pursued further. The optimum scales of the various vocational programs need to be ascertained. Such information is essential to making decisions as to the optimal composition and level of vocational education in various schools. Part of this research effort needs to be directed at the development of data more useful in economic analysis of vocational education. A pilot study to specify data to be maintained in consistent classifications at the school and the program level would assist in the analysis of production and cost functions of various programs.

The range of differences in the rates of return by program within each school may indicate a need for a change in the allocation of funds among programs. However, this range in measured differences reflects differences in the preferences of trainees concerning various occupations as well as differences in market demand for the array of skills. It is hoped that the results of this study will assist the state government and school administrators in their effort to allocate resources among the various programs. Moreover, the estimated rates of return on the various programs should prove useful to potential trainees in their selection of areas of training.

# APPENDICES

# APPENDIX A

[illegible]

(Vocational High Schools)

Year 19__ - 19__

Name of school _____

Address _____

_____

_____

Administration

Personal Services, Salaries and Wages

| | | | |
|---|---|---|---|
| A-1 | Salaries-Members-Board of Education | 4 000 01001 | |
| A-1a | Salaries-Members-Board of Education | 4 000 01002 | |
| A-2 | Salary-Clerk | | |
| A-2a | Salaries-Assistant to Clerk | 4 000 01003 | |
| A-2b | Salaries-Staff in Clerk's Office | 4 000 01004 | |
| A-3 | Salary-Business Manager | 4 000 01005 | |
| A-3a | Salaries-Employees in Business Manager's Office | 4 000 01006 | |
| A-4 | Salaries-Officers and Employees in Charge of Accounts | 4 000 01007 | |
| A-5 | Salaries-Officers and Employees in Charge of Supplies | 4 000 01008 | |
| A-6 | Salary-Superintendent of Schools | 4 000 01009 | |
| A-6a | Salaries-Assistant Superintendents or Local Superintendent | 4 000 01001 | |
| A-6b | Salaries-Employees in Superintendent's or Local Superintendent's Office | 4 000 01001 | |
| A-7 | Salaries-Officers and Employees for Administration of Vocational Relations | 4 000 01002 | |
| A-8 | Salaries-Officers and Employees for School Census | 4 000 01004 | |
| A-9 | Salaries-Officers and Employees for Administration of Coordinate Activities | 4 000 01005 | |
| A-10 | Salaries-Other Employees for Administration Buildings | 4 000 01006 | |
| A-11 | Salaries-Other Employees for General Administration | 4 000 01007 | |
| A-31 | Salaries-Legal Services | 4 000 01031 | |

Supplies

| | | | |
|---|---|---|---|
| B-1 | Administration Offices | 4 000 21001 | |

Equipment Replacement

| | | | |
|---|---|---|---|
| D-1 | Administration Offices | 4 000 30001 | |

Contractual and Open Service

| | | | |
|---|---|---|---|
| E-1 | Rent-Administration Offices and Buildings | 4 000 [illegible] | |
| E-2 | Repairs-Equipment-Administration | 4 000 [illegible] | |
| E-3 | Service Fund | 4 000 [illegible] | |

[illegible]

E-16 Transportation of Employees - Administration 4 000 23004

E-17 [illegible] 4 000 23005

E-19 Expenses-Employees-Professional Meetings 4 000 23002

Fixed Charges

F-1 Rent-Principals' Offices and Buildings 4 000 27005

F-5 Employees' Retirement Contributions 4 000 29051

F-5a Employees' Retirement Contributions 4 000 29052

F-7 Other Fixed Charges and Contributions (Health Insurance) 4 000 29097

Instruction-Supervision of Vocational Arts

Personal Services, Salaries and Wages

A-12 Salaries-Supervisors-Day School 4 010 01001

A-12a Salaries-Supervisors-Summer School 4 010 01002

A-12b Salaries-Supervisors-Evening School 4 010 01003

A-12c Salaries-Supervisors-Trade School 4 010 01004

A-13 Salaries-Supervisors' Clerks-Day School 4 010 01001

A-13a Salaries-Supervisors' Clerks-Summer School 4 010 01002

A-13b Salaries-Supervisors' Clerks-Evening School 4 010 01003

A-13c Salaries-Supervisors' Clerks-Trade School 4 010 01004

Contract and Open Service

E-16a Transportation of Employees - Supervisors 4 010 23005

E-19 Expenses-Employees-Professional Meetings 4 000 23002

Fixed Charges

F-5 Employees' Retirement Contributions 4 000 29051

F-5a Employees' Retirement Contributions 4 000 29052

F-7 Other Fixed Charges and Contributions (Health Insurance) 4 000 29097

Instruction-Principal or Director of a School

Personal Services, Salaries and Wages

A-14 Salaries-Principals-Day School 4 010 01001

A-14a Salaries-Principals-Summer School 4 010 01002

A-14b Salaries-Principals-Evening School 4 010 01003

A-14c Salaries-Principals-Trade School 4 010 01004

A-15 Salaries-Principals' Clerks-Day School 4 010 01001

A-15a Salaries-Principals' Clerks-Summer School 4 010 01002

A-15b Salaries-Principals' Clerks-Evening School 4 010 01003

A-15c Salaries-Principals' Clerks-Trade School 4 010 01004

E-19 Expenses-Employees-Professional Meetings 4 000 23002

Contract and Open Service

E-16a Transportation of Employees-Principals and Directors 4 010 23005

Fixed Charges

| | | | |
|---|---|---|---|
| I-5 | Teachers' Retirement Contributions | 4 290 29051 | |
| I-6a | [illegible] | 4 290 29052 | |
| I-7 | Other Fixed Charges and Contributions (Health Insurance) | 4 290 29057 | |

Instruction-Regular Teachers

Personal Services, Salaries and Wages

| | | | |
|---|---|---|---|
| A-10-1 | [illegible] | 4 010 01001 | |
| A-10-2 | [illegible] | 4 010 01101 | |
| A-10-3 | [illegible] | 4 010 01002 | |
| A-10-4 | [illegible] | 4 010 01102 | |
| A-10-5 | [illegible] | 4 010 01003 | |
| A-10-6 | [illegible] | 4 010 01103 | |
| A-10-7 | [illegible] | 4 010 01004 | |
| A-10-8 | [illegible] | 4 010 01104 | |
| A-10b-1 | [illegible] | 4 010 01005 | |
| A-10b-2 | [illegible] | 4 010 01105 | |

Contract and Other Service

| | | | |
|---|---|---|---|
| I-10a | Transportation of Employees - Regular Teachers | 4 010 29004 | |
| I-10 | Expenses-Employees-Professional Meetings | 4 000 29007 | |

Fixed Charges

| | | | |
|---|---|---|---|
| I-5 | Teachers' Retirement Contributions | 4 290 29051 | |
| I-7 | Other Fixed Charges and Contributions (Health Insurance) | 4 290 29057 | |

Instruction-Vocational Teachers

Personal Services, Salaries and Wages

| | | | |
|---|---|---|---|
| A-10-1 | Salaries-Regular Teachers-Day School | 4 010 01001 | |
| A-10-2 | Salaries Substitute Teachers- Day School | 4 010 01101 | |
| A-10c-1 | Salaries-Regular Teachers-Trade School | 4 010 01035 | |
| A-10c-2 | Salaries-Substitute Teachers-Trade School | 4 010 01235 | |

Contract and Other Service

| | | | |
|---|---|---|---|
| I-10a | Transportation of Employees-Vocational Teachers | 4 000 29005 | |
| I-10 | Expenses-Employees-Professional Meetings | 4 000 29007 | |

Fixed Charges

| | | | |
|---|---|---|---|
| I-5 | Teachers' Retirement Contributions | 4 290 29051 | |
| I-7 | Other Fixed Charges and Contributions (Health Insurance) | 4 290 29057 | |

Other Expenditures-All Instruction Activities

Personal Services, Salaries and Wages

| | | | |
|---|---|---|---|
| A-17 | Salary-Compulsory Attendance Officer | 4 070 01071 | |
| A-18 | Salary-Medical Inspection | 4 070 01072 | |
| A-19 | Salary-Dental Inspection | 4 070 01073 | |
| A-20 | Salaries-Census | 4 070 01074 | |
| A-21 | Salaries-Employees in Compulsory Attendance Officer's Office | 4 070 01075 | |
| A-21a | Salaries-Health Service Employees | 4 070 01076 | |
| A-21b | Salaries-Other Coordinate Activities | 4 070 01077 | |

Other Expenditures-Libraries

Personal Services, Salaries and Wages

| | | | |
|---|---|---|---|
| A-22 | Salaries- Employees for Libraries | 4 030 01031 | |

Supplies

| | | | |
|---|---|---|---|
| B-5 | Books-School Library | 4 030 21053 | |
| B-5a | Periodicals - School Library | 4 030 21036 | |
| B-5b | Newspapers-School Library | 4 030 21035 | |

Other Expenditures-Transportation of Pupils

Personal Services, Salaries and Wages

| | | | |
|---|---|---|---|
| A-23 | Salaries-Employees for Transportation of Students | 4 070 01071 | |

Supplies

| | | | |
|---|---|---|---|
| B-2 | Motor Vehicles -Transportation of Students | 4 070 29001 | |

Materials for Maintenance

| | | | |
|---|---|---|---|
| C-3 | Motor Vehicles-Transportation of Students | 4 070 2202 | |

Equipment Replacement

| | | | |
|---|---|---|---|
| D-2 | Motor Vehicles-Transportation of Students | 4 070 30001 | |

Contract and Open Service

| | | | |
|---|---|---|---|
| E-4 | Repairs-Motor Vehicles -Transportation of students | 4 070 23003 | |
| E-12 | Transportation of Students- Contract | 4 070 23005 | |
| E-12a | Transportation of Students-Parental | 4 070 23009 | |

Other Expenditures-Playgrounds and Community Centers

Personal Services, Salaries and Wages

| | | | |
|---|---|---|---|
| A-24 | Salaries-Employees for Playgrounds | 4 050 01021 | |
| A-24a | Salaries-Employees for Community Centers | 4 050 01031 | |

| | | |
|---|---|---|
| Supplies | | |
| B-9 | Recreational-Playgrounds | 4 290 21094 |
| Equipment Replacement | | |
| B-6 | Recreational Equipment-Playgrounds | 4 290 30094 |
| Contracted Operations | | |
| E-7 | Repairs-Recreational Equipment-Playgrounds | 4 290 25094 |
| Other Instructional Materials | | |
| Personal Services, Salaries and Wages | | |
| A-2c | Salaries of Employees for Other Auxiliary Agencies | 4 253 01000 |
| A-34 | Special Services-Architectural | 4 290 01000 |
| A-35 | Salaries, Other Special Services | 4 290 01000 |
| Supplies | | |
| B-9a | Recreational-Gymnasium | 4 290 21097 |
| Equipment Replacement | | |
| B-6a | Recreational Equipment-Gymnasium | 4 290 30097 |
| Contracted Operations | | |
| E-7a | Repairs-Recreational Equipment-Gymnasium | 4 290 25097 |
| E-12 | Board and lodging in lieu of Transportation | 4 290 23010 |
| E-13 | Tuition to other Districts | 4 290 23102 |
| E-15 | Expenses- Employees-Professional Meetings | 4 000 23092 |
| Fixed Charges | | |
| F-5 | Teachers' Retirement Contributions | 4 290 29053 |
| F-5a | Employees' Retirement Contributions | 4 290 29059 |
| F-5b | County Board of Education Contributions | 4 290 29055 |
| F-5c | Tuition-Other Districts | 4 290 29011 |
| F-5d | Other-Pension Fund Deductions | 4 290 29093 |
| F-6 | Workmen's Compensation | 4 290 29053 |
| F-6a | Disabled Children's Relief | 4 290 29054 |
| F-6b | State Treasurers' Charge | 4 290 29050 |
| F-6c | Election Expense | 4 290 29300 |
| F-6d | Advertising Delinquent Lands | 4 290 29310 |
| F-6e | Auditor and Treasurers' Fees | 4 290 29041 |
| F-7 | Other-Fixed Charges and Contributions (Health Insurance) | 4 290 29200 |
| | | 4 290 29097 |

Other Expenditures for School Plant Operation

| | | |
|---|---|---|
| J-2 | Rent | 4 [illegible] |
| J-3 | Other - Rent for Public Purposes | 4 [illegible] |

Operation and Maintenance of School Plant-Operation of School Plant

Personal Services Salaries and Wages

| | | |
|---|---|---|
| A-27 | Salaries-Janitors | 4 060 [illegible] |
| A-28 | Salaries-Engineers | 4 060 [illegible] |
| A-29 | Salaries of Employees for Other School Plant Operation | 4 060 [illegible] |

Supplies

| | | |
|---|---|---|
| F-3 | Motor Vehicles-Other | |
| F-7 | Fuel | 4 060 [illegible] |
| B-8 | Supplies-Janitors | 4 060 [illegible] |
| B-8a | Supplies-Engineers | 4 060 [illegible] |
| B-10 | Other-Supplies | 4 060 [illegible] |
| | | 4 060 [illegible] |

Contract and Open Service

| | | |
|---|---|---|
| F-6a | Repairs - Equipment- Janitors | 4 060 [illegible] |
| F-6b | Repairs-Equipment-Engineers | 4 060 [illegible] |
| F-9 | Water | 4 060 [illegible] |
| F-10 | Electricity | 4 060 [illegible] |
| F-11 | Telephone | 4 060 [illegible] |
| F-12b | Transportation of Employees-Janitors | 4 060 [illegible] |
| F-12c | Transportation of Employees-Engineers | 4 060 [illegible] |
| F-12d | Hauling-Transportation charges | 4 060 [illegible] |
| F-12a | Hauling-Trash and Garbage Disposal | 4 060 [illegible] |
| F-20 | Other - Contract and Open Order Service Expense | 4 060 [illegible] |

Fixed Charges

| | | |
|---|---|---|
| F-2 | Rent-Instruction Rooms and Buildings | |
| F-3 | Insurance | 4 060 [illegible] |
| F-4 | Taxes and Assessments | 4 060 [illegible] |
| F-5a | Employees' Retirement Contributions | 4 060 [illegible] |
| F-7 | Other Fixed Charges and Contributions (Health Insurance) | 4 250 [illegible] |
| | | 4 250 [illegible] |

Operation and Maintenance of School Plant-Maintenance of School Plant

Personal Services Salaries and Wages

| | | |
|---|---|---|
| A-30 | Salaries - Employees for Maintenance of Equipment and Plant | |
| A-31 | Salaries - Employees for Maintenance of Equipment and Grounds | 4 061 [illegible] |
| A-5 | Salaries - Employees for Other Purposes | 4 061 [illegible] |
| | | 4 [illegible] |

Materials for Maintenance

| | | | |
|---|---|---|---|
| C-1 | Buildings and Grounds | 4 061 21009 | |
| C-2 | Equipment and Furniture | 4 061 21013 | |
| C-4 | Motor Vehicles- Other | 4 061 22005 | |
| C-5 | Other- Materials for Maintenance | 4 061 21099 | |

Equipment Replacement

| | | | |
|---|---|---|---|
| D-3 | Motor Vehicles -Other | 4 061 30010 | |
| D-5 | Materials-Janitors | 4 061 21004 | |
| D-5a | Materials-Engineers | 4 061 21012 | |
| D-7 | Other-Equipment Replacements | 4 061 30099 | |

Contract and Open Service

| | | | |
|---|---|---|---|
| E-2 | Repairs-School Buildings | 4 061 26051 | |
| E-5a | Employees' Retirement Contributions | 4 290 29052 | |
| E-7 | Other Fixed Charges and Contributions (Health Insurance) | 4 290 29097 | |
| E-5 | Repairs- Motor Vehicles-Other | 4 061 22004 | |
| E-8 | Repairs-Other Equipment | 4 061 26099 | |

I. General Information:

A. Have enrollment _____

B. Number of days in school year ___ _____

II. Use of Pupil hours of academic education instruction.

A. Number of class hours in a school week _____ .

B. Number of non-vocational pupils in the school _____

*C. Multiply A times B _____

D. In each class of vocational education, supply the number of hours of vocational instruction per week.

Class
(1)____ (4)____ (7)____ (10)____ (13)____ (16)____

(2)____ (5)____ (8)____ (11)____ (14)____

(3)____ (6)____ (9)____ (12)____ (15)____

E. In each class of vocational education, supply the number of pupils in each class. (Parts D and E should be consistent.)

Class
(1)____ (4)____ (7)____ (10)____ (13)____ (16)____

(2)____ (5)____ (8)____ (11)____ (14)____

(3)____ (6)____ (9)____ (12)____ (15)____

*F. Subtract each entry in part D from the total in part A and multiply it by the corresponding entry in part E.

Class
(1)____ (4)____ (7)____ (10)____ (13)____ (16)____

(2)____ (5)____ (8)____ (11)____ (14)____

(3)____ (6)____ (9)____ (12)____ (15)____

*G. Sum the figures arrived at in F. _____

*H. Sum the results of C and G. _____

*I. Divide each entry in part F by the total computed in part H.

Class
(1)____ (4)____ (7)____ (10)____ (13)____ (16)____

(2)____ (5)____ (8)____ (11)____ (14)____

(3)____ (6)____ (9)____ (12)____ (15)____

J. Total salaries and related expenditures for academic teachers. _____

*K. Multiply the entry in part J by each entry in part I.

Class
(1)_____ (4)_____ (7)_____ (10)_____ (13)_____ (16)_____

(2)_____ (5)_____ (8)_____ (11)_____ (14)_____

(3)_____ (6)_____ (9)_____ (12)_____ (15)_____

L. Total costs for academic texts and supplies. _____

*M. Multiply the entry in part L by each entry in part I.

Class
(1)_____ (4)_____ (7)_____ (10)_____ (13)_____ (16)_____

(2)_____ (5)_____ (8)_____ (11)_____ (14)_____

(3)_____ (6)_____ (9)_____ (12)_____ (15)_____

N. Total costs for academic laboratory equipment. _____

*O. Multiply the entry in part N by each entry in part I.

Class
(1)_____ (4)_____ (7)_____ (10)_____ (13)_____ (16)_____

(2)_____ (5)_____ (8)_____ (11)_____ (14)_____

(3)_____ (6)_____ (9)_____ (12)_____ (15)_____

*P Multiply each entry in part D by its corresponding entry in part E.

Class
(1)_____ (4)_____ (7)_____ (10)_____ (13)_____ (16)_____

(2)_____ (5)_____ (8)_____ (11)_____ (14)_____

(3)_____ (6)_____ (9)_____ (12)_____ (15)_____

*Q. Sum the entries in part P. _____

*R. Divide each entry in part P by the total in part Q.

Class
(1)_____ (4)_____ (7)_____ (10)_____ (13)_____ (16)_____

(2)_____ (5)_____ (8)_____ (11)_____ (14)_____

(3)_____ (6)_____ (9)_____ (12)_____ (15)_____

5. Total salaries and related expenditures for vocational teachers. _____

*7. Multiply each entry in part B by the figure in part 5.

Class

(1)____ (4)____ (7)____ (10)____ (13)____ (16)____

(2)____ (5)____ (8)____ (11)____ (14)____

(3)____ (6)____ (9)____ (12)____ (15)____

* NOT NECESSARY TO COMPUTE

## APPENDIX B

Information Sheet

(Vocational High Schools)

Date _____

Name of School _____

Address _____ Phone _____

_____

_____

Year vocational education started _____

Superintendent _____

Number of trainees (T), graduates (G) and instructors (I) by program

| Program | 1970-71 | | | 1969-70 | | | 1968-69 | | | 1967-68 | | | 1966-67 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | T | G | I | T | G | I | T | G | I | T | G | I | T | G | I |
| 1. Welding | | | | | | | | | | | | | | | |
| 2. Drafting | | | | | | | | | | | | | | | |
| 3. Automotive Mech. | | | | | | | | | | | | | | | |
| 4. Auto Body | | | | | | | | | | | | | | | |
| 5. Cosmetology | | | | | | | | | | | | | | | |
| 6. Mech. Mch. Shop | | | | | | | | | | | | | | | |
| 7. Steno and Sec. | | | | | | | | | | | | | | | |
| 8. Gen. Office | | | | | | | | | | | | | | | |
| 9. Accounting | | | | | | | | | | | | | | | |
| 10. Agric. Prod. | | | | | | | | | | | | | | | |
| 11. Agric. Mech. | | | | | | | | | | | | | | | |
| 12. Gen. Merch. | | | | | | | | | | | | | | | |
| 13. Apparel Acces. | | | | | | | | | | | | | | | |
| 14. Fabric Service | | | | | | | | | | | | | | | |
| 15. Food Prep. | | | | | | | | | | | | | | | |
| 16. Child Care | | | | | | | | | | | | | | | |
| 17. Trade | | | | | | | | | | | | | | | |

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APPENDIX C

Information Sheet

(Vocational Trainee)

Date_____

(1) School_____

(2) Name_____ (3) Social Security Number_____

(4) Present address_____

(5) Last address before enrollment_____

(6) Enrollment date_____ (7) Sex_____ (8) Race_____

(9) Date of birth_____ (10) Place of birth_____

(11) Years of schooling completed before enrollment_____

(12) Father's occupation_____ (13) Mother's occupation_____

(14) Status before enrollment

a. student_____

b. employed_____ c. type of work_____

d. hours per week_____

e. hourly earnings_____

(15) Current Employment Status

a. unemployed_____

b. employed_____ c. type of work_____

d. hours per week_____

e. hourly earnings_____

(16) Vocational program_____

(17) Trainee out-of-pocket expenses (lab and equipment fees, etc.)_____

(18) Plans after completion of vocational training

a. seek employment_____

b. continue education college other(specify)_____

c. military service_____

d. other(specify)_____

Form 3: VOC-ED 71-A-134